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(12) UK Patent Application (19) GB (11) 2 184 433 (13) A

(43) Application published 24 Jun 1987

(21) Application No 8629703

(22) Date of filing 12 Dec 1986

(30) Priority data

(31) 8530854  
8611602

(32) 14 Dec 1985  
13 May 1986

(33) GB

(51) INT CL<sup>4</sup>

C04B 35/00 41/86 F24C 15/24

(52) Domestic classification (Edition I):

C1J 10 17 24 X  
F4W 46B

(56) Documents cited

None

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(58) Field of search

C1J  
F4W  
Selected US specifications from IPC sub-classes C04B  
F24C

(54) Hollow imitation coal elements

(57) A method for facilitating the production of hollow imitation coal elements in which a mass 11 of raw ceramic bulk fibres, impregnated with a liquid stiffening agent 13, is, for example, vacuum formed into a box-like shape 14, open to one face 15, with one edge of its open face 15 having a flap or lid 16, taken from the mass 11, which can simply be folded over to close the box-shape 14 prior to the further (e.g. heat) treatment of the shape to turn it into the imitation coal element.

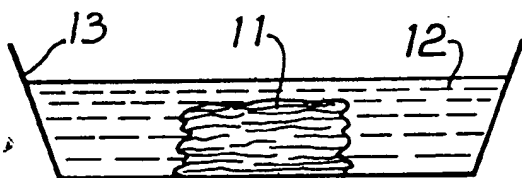


Fig. 1

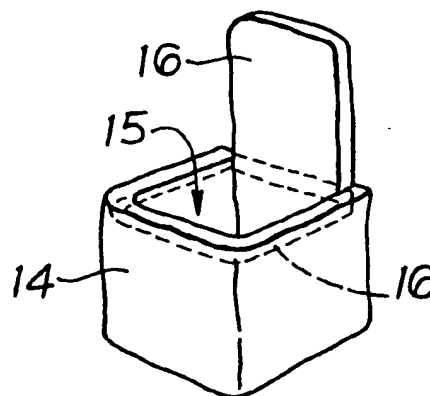


Fig. 2

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The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

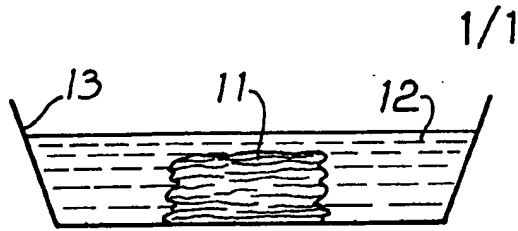


Fig. 1

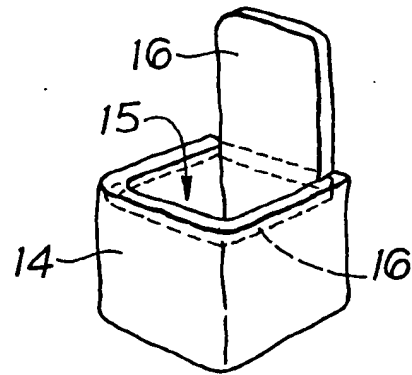


Fig. 2

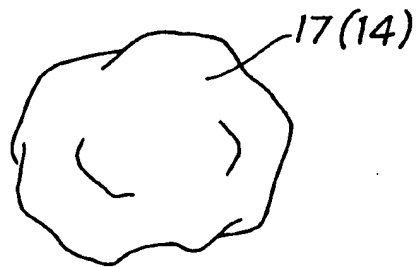


Fig. 3

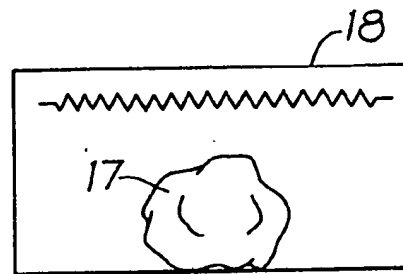


Fig. 4

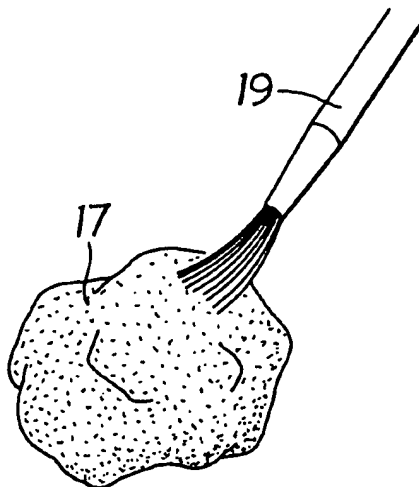


Fig. 5

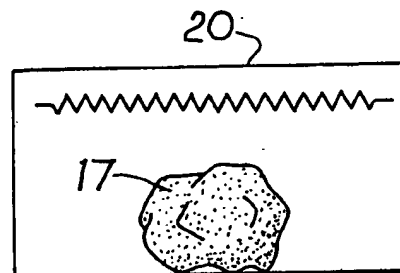


Fig. 6

## SPECIFICATION

## Hollow imitation coal

5 This invention concerns hollow coal and more particularly a method of making said hollow imitation coal (hereinafter referred to as imitation coal element(s)).

10 Imitation coal elements are used in open domestic firegrates, typically being of cement and/or concrete, and in simulated fuel effect gas fires. In both instances of use as aforesaid flames are played on the imitation coal elements from below so that the elements absorb heat and eventually glow and thereby radiate some of the absorbed heat.

15 In my U.S. Patent No. 4233348 and my co-pending British Patent Application No. 85 25062 (published under GB No. 2165533), I have described a method of making imitation coal elements which involves the use of raw ceramic bulk fibres. In said method, an appropriate mass of said fibres is moistened with a cold and/or hot binding or stiffening agent  
20 such as cold potato starch or hot colloidal silicate and is then squeezed to shape, which squeezing expresses any excess moisture. The next step is to bake the shaped mass to set the stiffening agent and fix the shape. Thereafter, the element can be glazed or coloured by dipping it in glaze or colouring agent.

It should be understood that the imitation coal element made by the foregoing method is normally solid.

35 Application No. 85 25062 does disclose the use of the mass of raw ceramic bulk fibres to make a hollow element by vacuum forming the mass so that it is hollow.

40 The problem with known methods of vacuum forming hollow coal elements is that the formed element is open to one face which makes it difficult to form the final totally enclosed hollow element. One must normally take a separate mass of ceramic bulk fibres and apply it to the opening of the vacuum formed element to close the opening off. Alternatively, the material of the vacuum formed element must be manipulated so that the opening is closed off.

50 However, it is important to mention that it is possible to form hollow imitation coal elements other than by vacuum forming.

55 In view of this possibility therefore, and in order to overcome the problem hereinbefore posed, the present invention provides a method of producing a hollow imitation coal element comprising the steps of forming a mass of raw ceramic bulk fibres into a substantially box-like shape with at least one  
60 open face, characterised in that at least one edge of the or each open face is formed with a flap or lid taken from said mass and before hardening the element the flap or the lid is folded over the open face permanently to  
65 close the same.

The method of the present invention can be employed for producing imitation coal elements not only by vacuum forming the mass of raw ceramic bulk fibres but also by other means such as hand fabricating, by cutting from solid, blow moulding techniques and the like or compression moulding.

70 The invention will be described further, by way of example, with reference to the accompanying drawing in which Figs. 1 to 6 illustrate the various steps of a preferred method of producing hollow imitation coal elements of the invention, it being understood that the following is illustrative and not limitative of the scope of the present invention.

80 Referring now in detail to the drawing, as a first step (Fig. 1) in making the hollow imitation coal element of the present invention mass 11 of raw ceramic bulk fibres is taken from a slurry (not shown) and is steeped in a bath 12 containing a liquid stiffening agent 13, such as potato starch dispersion or a commercially-available ceramic rigidiser, so that the mass 11 is impregnated with the agent 13.

90 The impregnated mass 11 is now formed into a hollow box-like shape 14 (Fig. 2), open to one face 15, by fabricating, or by cutting from solid, or by blow moulding techniques and the like, or by compression moulding. During such formation, part of the mass 11 used in forming the shape 14 is used to form a flap or lid 16 on one edge of the open face 15.

100 As an alternative to the aforesaid forming methods, the impregnated mass 11 may be placed in appropriate vacuum shaping apparatus (not shown) and vacuum formed into a similar hollow box-like (e.g. cubic) shape 14 open to one face 15. One edge of the open face 15 of the shape 14 is formed with a flap or lid 16 taken from the mass 11 used in forming the rest of the shape 14. The vacuum formed shape, which is still fairly flexible or pliable, is then removed from the vacuum forming apparatus.

110 Whichever of the foregoing methods is used to form the shape 14, the integrally formed flap or lid 16 is subsequently folded over the open face 15 of the shape 14 to the position shown in outline in Fig. 2 so that the flap or lid 16 is within the three other inside edges of the open face 15. In view of the fact that the surface of the shape 14 will at this state still be tacky, the edges of the flap or lid 16 should adhere to the inside edges of the open face 15 without difficulty. The shape 14 will at this stage be fully enclosed but of course hollow.

120 The regular appearance of the shape 14 can be given an irregular shape 17 appearance by squeezing and shaping it e.g. by hand (Fig. 3).

130 The irregular shape 17 is now placed into an oven 18 (Fig. 4) at a temperature of 250°F (121°C) for 2 hours so that it hardens. At this stage it is colourless (white). The hardened

irregular shape 17 is then coloured (Fig. 5) e.g. black by being painted with a brush 19, and again placed in an oven 20 at 250°F (121°C) for two hours (Fig. 6). The coal element thus produced is organic. To produce an inorganic hollow ceramic fibre coal for modern, more efficient decorative gas fires an additional step of burning out is required between the step of hardening and colouring. In the latter said step (not shown) the dried shape is brushed with a solution containing 15% colloidal silicate and placed in an oven at 900°C for 15 minutes which renders the organic shape inorganic.

- 15 To increase the emissivity of the element, the slurry of raw ceramic bulk fibres from which the mass is taken can contain wood particles or chippings. As wood is an organic material the wood chippings or particles will be burnt out of the hardened shape during the burning out step leaving small enclosed pockets in the shape.

The hardening and colouring steps can be combined by including the colouring (black) dye in the original slurry. Due to the fact that the element is hollow most of the dye will be retained in its then wall, particularly if it is vacuum formed, rather than being dispersed into the centre of the element as is the case with a solid (non-hollow) element.

The production of hollow imitation coal elements in accordance with the present invention has many advantages over known imitation coal elements, particularly solid (non-hollow) elements. There are considerable savings in the amount of material used in making the imitation coals (upwards of 50% or more).

The time taken to produce individual elements can be reduced from a typical 10 hour period to just 2 hours. It follows from this that production numbers can be increased considerably and that there is labour costs per element. Furthermore, the element of the invention can be made from a single mass of raw ceramic bulk fibres and in fairly simple and easy, trouble free steps.

#### CLAIMS

1. A method of producing hollow imitation coal elements comprising the steps of forming a mass of raw ceramic bulk fibres into a substantially box-like shape with at least one open face, characterised in that at least one edge of the or each open face is formed with a flap or lid taken from said mass and before hardening the element the flap or lid is folded over the open face permanently to close the same.

2. A method as claimed in claim 1 wherein the mass of fibres is taken from a slurry and prior to being formed into a box-like shape is steeped in a bath containing a liquid stiffening agent, such as potato starch dispersion or a commercially-available ceramic rigidiser, so that the mass is impregnated with the agent.

3. A method as claimed in claim 1 or 2 wherein the box-like shape is formed by hand fabricating, or by blow moulding techniques, or by compression moulding, or by cutting from solid, or by vacuum forming.

4. A method as claimed in claim 3 wherein the box-like shape is given an irregular appearance by squeezing and shaping it e.g. by hand, is then placed in an oven at a temperature of 250°F (121°C) for two hours so that it hardens and is then coloured and placed again in an oven at 250°F (121°C) for two hours, the coal element thus produced being organic.

5. A method as claimed in claim 4 wherein between the step of hardening and colouring there is the additional step of burning out by means of the shape being brushed with a solution containing 15% colloidal silicate and placed in an oven at 900°C for 15 minutes which renders the inorganic shape organic.

6. A method as claimed in claim 5 wherein the slurry of raw ceramic bulk fibres from which the mass is taken contains wood particles or chippings which because of their being organic will burn out of the hardened shape during the burning out step leaving small enclosed pockets in the shape and thereby increasing its emissivity.

7. A method as claimed in claim 4 wherein the hardening and colouring steps are combined by including a colouring dye in the slurry.

8. A method of producing hollow imitation coal elements substantially as hereinbefore described with reference to the accompanying drawing.

Printed for Her Majesty's Stationery Office  
by Burgess & Son (Abingdon) Ltd, Dd 8991685, 1987.  
Published at The Patent Office, 25 Southampton Buildings,  
London, WC2A 1AY, from which copies may be obtained.